

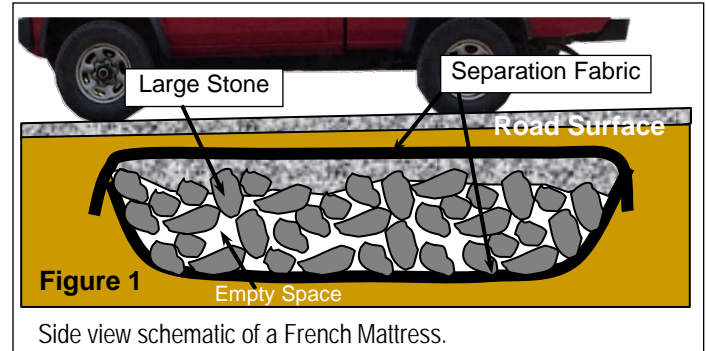
Technical Bulletin

French Mattress

FRENCH MATTRESS – A structure under a road consisting of clean coarse rock wrapped in fabric through which water can freely pass. French Mattresses are used in wet soils, such as in wetlands, to support the roadbed while allowing unrestricted water movement.

CRITERIA FOR FRENCH MATTRESS US

- Areas where concentrated outlet flow through a pipe is undesirable, impractical, or regulated.
- Low-lying areas near streams or wetlands where installing cross drains would be difficult due to lack of grade or vegetation.
- Areas where the road acts as a dam by cutting off the natural flow of subsurface water.
- Areas with a high water table.



BENEFITS OF FRENCH MATTRESSES

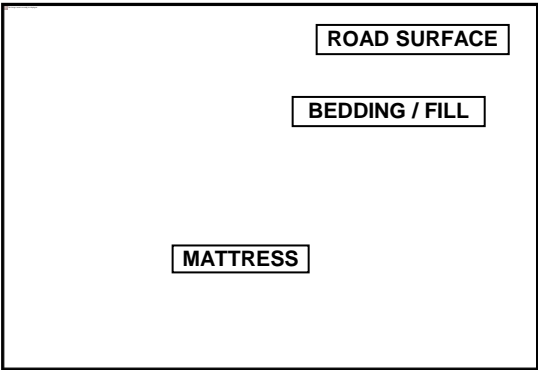
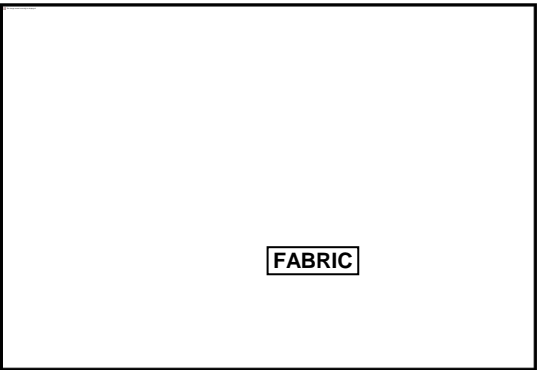
- stabilize the road base in areas where the road is weakened by water saturation
- allow for bi-directional free flow of water through road base
- maintain dispersed flows and prevents gully erosion above or below the structure
- can be used in wetland situations where a traditional pipe may lower the wetland water level
- require no maintenance and has a long service life
- are extremely difficult for beavers to plug, unlike pipes
- maintain natural vegetative communities and habitat by connecting floodplains

IMPORTANT MATTRESS CONSIDERATIONS

- Mattresses are **NOT** stream or road drainage pipe replacements. Mattresses should **NOT** be used for concentrated overland flow, such as small stream channels or stormwater from ditches. These flows naturally carry sediment, which will clog the mattress over time.
- Mattress sizes are very flexible. In the example below, three small mattresses were used to drain several springs and seeps. In the example on the back, a large mattress was used to allow wetland flow through during high flows. The width, depth, and size of stone used will all affect the flow capacity of the mattress.
- The finished mattress should be covered by at least 8 inches of compacted fill material.
- French mattresses should be installed to match the slope of the land. In wetland situations, this slope may be minimal. In sloped areas (as pictured below), a 1- to 2-percent slope should be used to aid drainage.



This small mattress is shown during and after construction. It was used in conjunction with two other mattresses to drain a group of small hillside seeps that saturated the roadway. Notice the water flowing out of the mattress in the after picture.



CONSTRUCTION SEQUENCE

The large mattress illustrated to the left uses large stone to accommodate a wide wetland. Numbers refer to picture sequence.

1. Excavate the mattress to desired depth, allowing for min 8 inches of cover over the finished mattress. Place geotextile fabric in the trench, leaving enough fabric on the sides to overlap on the top of the finished mattress.
2. Place porous stone on top of the fabric and spread out into a uniform bed. If stone in mattress is very large, smaller stone may be spread on top to provide even support for fabric.
3. Wrap ends of fabric over top of structure. Place a piece of fabric on the top if existing fabric does not completely cover mattress. Overlap all fabric joints by at least 12 inches.
4. Compact min 8" fill over top of finished mattress. (Driving surface does not count as "fill")

MATERIALS REQUIRED FOR A FRENCH MATTRESS

- **Geotextile fabric** (Class 2 Woven). Fabric around the mattress allows water to pass through while blocking fine silt and clay, which would eventually clog the structure. In situations where water flowing into the mattress may contain sediment (farm fields, etc.), the ends of the mattress should also be wrapped in fabric.
- **Clean stone.** It is important to use clean stone. Clean stone is relatively uniform in size with no fine material. Typically 3- to 4-inch-diameter stone is used. Larger stones will increase the flow capacity of the mattress.

EQUIPMENT REQUIRED FOR A FRENCH MATTRESS

- **Excavator/backhoe:** Needed to excavate trench; helps to spread stone after dumping.
- **Trucks:** Needed to import clean stone and haul away excavated material.
- **Hand Tools:** Rakes and shovels to move and level stone.
- **Compaction:** A tamper or vibratory plate can compact fill over small mattresses. A roller is needed for larger mattresses.

Reminder: A French Mattress should never be used to replace a standard stream pipe or road drainage crosspipe. The frequent flows and sediment load from these sources will eventually clog the mattress.



This roadway cuts across a floodplain wetland. A 300 foot long French mattress was used to provide relief for wetland flows while providing a stable road base and preventing beavers from damming the nearby stream pipe.